

MSD Safety Guidelines

2002 Version

Research activities in MSD can involve hazardous processes and materials. The information and rules presented here are designed to help you understand and maintain consistent safety practices. These guidelines are a supplement to LBNL's official safety document, LBNL PUBLICATION 3000.

All MSD employees and guests who work on the Hill should be familiar with the following Concepts and Terms

- **Publication 3000**
Pub 3000 is the Environmental, Health, and Safety manual of Berkeley Lab and is the definitive guide to Laboratory safety and environment policies and procedures. It is located on the web at <http://ehs.lbl.gov/ehsdiv/pub3000>.
- **Training**
LBNL policy requires that all staff, participating guests, and others who perform work at the LBNL main site receive appropriate training necessary to protect their health and perform work in a safe and environmentally sound manner. Training requirements are determined by filling out the on-line Job Hazard Questionnaire (JHQ) on the EHS Training web page (<http://training.lbl.gov/>). It is LBNL policy that all training requirements be completed within 6 months of joining the lab. Training requirements are satisfied by taking courses offered by the EHS division (some courses are available on-line). Supervisors may exempt personnel from required training courses by certifying that equivalent training has been obtained elsewhere (this is done on the EHS Training web page).
- **Group Safety Representative**
Each MSD research group on the LBNL main site has a group safety representative who is the group contact for safety related questions or problems and who also serves on the MSD Safety Committee.
- **Activity Hazard Document (AHD)**
This document is required for high hazard research activities and equipment (e.g., use of fluorine gas, class IV lasers). The AHD describes the safe operating procedure for the equipment or procedure.
- **Satellite Accumulation Area (SAA)**
An SAA is a space in or near the research area set aside to temporarily (max. 275 days) store hazardous waste before it is picked up by Waste Disposal.
- **Building Emergency Plan**
The building emergency plan explains what to do in the event of fire, earthquake or other emergencies and describes your evacuation route out of the building. The evacuation plan is posted on each floor of every LBNL building.
- **Stop Work Policy**
All LBNL employees, contractors, guests, and visitors are to stop work IMMEDIATELY if they encounter or discover any work-related activities that constitute an imminent danger. Stopping unsafe work applies to all activities conducted at LBNL and all off-site facilities and locations
- **Laboratory Emergency Number**
Dial x7911 from any lab phone to report emergencies

1. Environmental Health & Safety (EH&S) Division

LBNL's Environment, Health and Safety division (EH&S Division, <http://www-ehs.lbl.gov/>) provides EH&S support for laboratory activities and should be consulted on all major safety questions, such as the design of equipment, procedures for handling hazardous substances, and required safety documentation. The EH&S Division's liaison to MSD is John Seabury (x6547, JJSeabury@lbl.gov).

2. EH&S in the Materials Sciences Division

2.1. Principal Investigators (PIs) are responsible and accountable to the MSD Division Director for assuring that all activities under their direction are carried out in a safe manner and in accordance with all LBNL EH&S policies and requirements. This responsibility and accountability cannot be delegated. Joel Ager (x6715, JWAger@lbl.gov) is the MSD Safety Coordinator and is Chair of the MSD Safety Committee. Each research group on the Hill site has a Group Safety Representative; this person functions as laboratory point of contact for EH&S matters and serves on the MSD Safety Committee (the current list of Group Safety Representatives can be obtained from the most recent minutes of the MSD Safety Committee at <http://www.lbl.gov/msd/Internal/Minutes>). The MSD Safety Committee develops EH&S policies and advises the Division Director on EH&S issues. Each building has a Building Emergency Response Team that is responsible for evacuating the building in emergencies (e.g. earthquakes). The Building Evacuation Plan is posted on each floor of every LBNL building. The MSD Internal web page (access through <http://www.lbl.gov/msd>) has links to MSD and laboratory safety information. Meg Holm (x5135, MCHolm@lbl.gov) is the MSD EHS Administrator.

2.2. Problems or questions concerning safety or occupational health may be directed to your supervisor, your Group Safety Representative, the MSD Safety Coordinator, or to the EH&S Division directly. If you work on the UCB Campus you are under the auspices of the Campus EH&S groups. However, you are free to seek the help of the LBNL agencies whenever necessary.

3. Training

LBNL policy requires that all staff, participating guests, and others who perform work at the LBNL main site receive appropriate training necessary to protect their health and perform work in a safe and environmentally sound manner. Training requirements are determined by answers given to the on-line Job Hazard Questionnaire (JHQ). The JHQ is located at <https://training.lbl.gov/EHSLogin.asp> and there is a link at bottom of page for taking JHQ without an LDAP login). It is LBNL policy that all training requirements be completed within 6 months of joining the lab. Until training requirements are met, you must work under the direct supervision of someone who has already received the training. Training requirements are satisfied by taking courses offered by the EHS division (some courses are available on-line). Supervisors may exempt personnel from required training courses by certifying that equivalent training has been obtained elsewhere (this is done by logging into the JHQ web site, LDAP login required). The EHS courses required for most MSD employees/guests are listed below.

EHS 010/392/405 or MSD 010 (on-line)	Introduction to LBNL EH&S, Hazard Communication Employee Training, and General Employee Radiation Training
EHS 260	Basic Electrical Hazard Awareness
EHS 348	Chemical Hygiene and Safety
EHS 231	Compressed Gas Safety
EHS 604	Hazardous Waste Generator Training
EHS 280	Laser Safety
EHS410	X-ray Machine Safety
ALS101	Safety at the Advanced Light Source

4. General Laboratory Rules and Guidelines

- 4.1. In case of injury, illness, or any kind of accident (e. g. fire, chemical spill, etc.) call x7911 immediately. If immediate medical attention is required, qualified personnel may administer first aid. Persons with minor ailments may go to Medical Services, Bldg. 26. All injuries, major or minor, must be reported to Medical Services, x6266.
- 4.2. The fire alarm bells located in the buildings can be activated locally from the fire alarm boxes. In case of an alarm, secure equipment and leave the building following evacuation routes posted in the building.
- 4.3. Individuals working alone in the laboratory or shop during off-hours should notify someone near by and should check out with that person on leaving.
- 4.4. If equipment is running unattended emergency phone numbers and shut-down procedures should be posted on the laboratory door. A form is available from the MSD EHS Administrator.
- 4.5. Laboratory doors must not be locked while the room is occupied.
- 4.6. Large mechanical vacuum pump exhaust lines should be connected to a building vent line. Consult Peter Ruegg, x5395.
- 4.7. Keep hallways and other passageways clear. They are not to be used as storage areas.
- 4.8. All water-hose connections must be secured with a hose clamp. Use fiber-reinforced tubing for water hoses.
- 4.9. A faceshield and gloves are required when filling and dispensing liquid nitrogen.

5. Personal Protective Equipment

- 5.1. All persons must wear safety glasses whenever they run a reasonable probability of eye injury resulting from work being performed. Examples of eye hazards include flying particles, molten metal, liquid chemicals, acids or caustics, chemical gases or vapors, or potentially injurious light radiation. Non-prescription safety glasses with polycarbonate lens and side shields are available from Stores (Item 4270-90021). Prescription safety glasses are available without charge with a current prescription. Call x7378 to make an appointment. Note: the lightweight, all-plastic glasses available at the entrances to machine shops and many labs are for visitors only; they are not adequate eye protection for hazardous work such as machining.

5.2. Safety shoes are sold once per month in the Cafeteria parking lot from a mobile van (call x2976 for a schedule). Employees/guest who require them are entitled to a partial reimbursement of the costs of these shoes. Hard hats and hearing protection equipment are available from Stores.

5.3. Other protective Equipment that may be required, such as respirators, air masks, etc., are available through EH&S Division.

6. Electrical Hazards and Guidelines

6.1. All personnel working in laboratories must take EHS 260 (Electrical Hazard Awareness for Researchers) or have their supervisor certify that equivalent training has been obtained.

6.2. No one is allowed to work on electrical equipment without obtaining supervisory approval. There are specific dangers associated with home-built equipment including the need for adequate grounding. No modifications to the electrical systems of large, permanent experimental or commercial devices should be made without checking first with Jim Severns or another qualified electronic technician.

6.3. All sources of dangerous voltage and/or current (e.g., exposed conductors and terminals) must be covered, shielded, or insulated to prevent accidental contact.

6.4. Daisy-chained extension cords (plugging one extension cord into another) are not permitted. Check cords for early signs of deterioration and discard damaged cords or have them repaired. Extension cords are for temporary usage only. If you need long term power in an area that is being served by extension cords, inquire about having permanent power installed.

6.5. Electrical power panels must have a clear space the width of the panel three feet deep in front of them. This clear space extends to the floor.

7. Chemicals

7.1. All personnel working with chemicals must take EHS 348 (Chemical Hygiene and Safety) or have their supervisor certify in writing that equivalent training has been obtained.

7.2. The best source for chemical hazard information are the Material Data Safety Sheets (MSDSs) located on the EH&S web site (http://www-ehs.lbl.gov/html/chemical_safety.htm).

7.3. Each container of chemical or product material must be assigned a bar-code and entered into the LBNL chemical inventory database. It is the responsibility of all groups using chemicals at Berkeley Lab to keep an updated inventory of chemicals. Each group's chemical inventory must be updated on a regular basis by sending the updated hard copy inventory sheet, with bar-codes attached, to the MSD EHS Administrator. Forms and bar codes are available from the MSD EHS Administrator and from Building Managers.

7.4. All reagent bottles and containers, including squeeze bottles, must be labeled with the chemical identity and hazard, even if they contain only water. Chemicals in multi-use areas should be identified by the individual owner's name. Incompatible chemicals must be separated. Containers of corrosive or flammable chemicals should be kept in approved flammable or acid cabinets.

7.5. Hydrogen fluoride (HF) can produce serious burns on the skin. All hoods with HF must have a HF burn gel kit, which is obtained from Medical Services. Note that the gel in the burn kits has an expiration date and must be periodically replaced.

8. Waste Disposal

8.1. Researchers requiring chemical and hazardous waste disposal services must take EHS 604 (Hazardous Waste Generators).

8.2. Satellite Accumulation Areas (SAAs) are clearly labeled secondary containment areas where all hazardous waste is stored before disposal. They must be located in or near the lab where the waste is generated. Each Satellite Accumulation Area must have a custodian, who is responsible for assuring that waste in the SAA is properly labeled, packaged and disposed of. Contact Howard Hansen (EHS Division, x5867, HLHansen@lbl.gov) for information on how to prepare and maintain your SAA.

8.3. Hazardous liquids must be stored in a secondary spill container. Waste flammable or combustible liquids are to be sorted into the categories of oils, halogenated or nonhalogenated solvents, and placed in appropriate containers for pick-up. Do not use glass containers over one quart capacity for flammable solvents. Used solvent wipes can go in any container, including plastic bags, but must be labeled and disposed of as hazardous waste.

8.4. To request a pick-up, complete a Hazardous Waste Disposal Requisition form and FAX to x4838. Forms can be obtained from Building Managers, the MSD EHS Administrator, or from the web at <http://www-ehs.lbl.gov/waste/html/forms.htm>. Unless authorized to do so (e.g. Bldg. 2 acid drain), do not dispose of any hazardous chemicals of any kind in any sink or drain!

8.5. Broken glass should be placed in sealed, labeled box and placed directly in a dumpster outside the building, not in the trash containers in the laboratory.

8.6. Spills of any kind must be cleaned up immediately.

Chemical Spill Cleanup Procedures: Laboratory personnel may clean up small spills of hazardous materials provided that all of the following conditions are met:

- The hazards of the material(s) are known, and appropriate precautions can be taken to prevent personal exposure;
- There is no potential of a release to the environment, and the spill is not generating a building-wide odor;
- There are no personal injuries;
- The clean up procedures are known and the proper equipment (e.g., PPE and spill clean up materials) is available. Large amounts of spilled water or nontoxic solids can be taken up with wet or dry vacuum cleaners. Other liquid spills can be soaked up with the proper absorbing material. Spill kits are available from VMR (<http://Purch1.lbl.gov/LBNL/vwr.htm>);
- The spill can be cleaned up safely by two people in one hour or less;
- The spill does not involve elemental mercury. Special cleanup and air monitoring is required in this case. Contact the Industrial Hygienist assigned to MSD (Larry McLouth, x5286 or x5251).

IF ALL OF THESE CONDITIONS ARE NOT MET THEN CALL x7911 AND NOTIFY THE SUPERVISOR AND THE FACILITY MANAGER.

9. Compressed Gases

- 9.1. All personnel working with compressed gases must take EHS 231 (Pressure Safety training) or have their supervisor certify in writing that equivalent training has been obtained.
- 9.2. The use of toxic or hazardous gases may require an Activity Hazard Document (AHD). Contact EH&S Division for information on using these gases.
- 9.3. Compressed gas cylinders must be securely fastened to a bench or wall. See Peter Ruegg (x5395) for proper installation.
- 9.4. Do not store cylinders of flammable gas within 20 feet of cylinders of oxygen or other oxidizing gas, unless separated by a fire rated barrier.
- 9.5. Use the appropriate pressure regulator for each gas. Do not modify connectors.
- 9.6. The valve-protection cap must be in place when a compressed gas cylinder is moved.
- 9.7. Return empty or unused cylinders to the appropriate area near your building. Ask your Building Manager for the cylinder rack location.

10. Transportation of Hazardous Materials

- 10.1. Use of vehicles. Only Facilities Transportation is authorized to transport hazardous materials in vehicles (except as indicated below). Transportation of hazardous materials by employees in public or private vehicles, including the LBNL bus, is not permitted because of the possibility of spillage or breakage of the container and resulting risk of injury to personnel and damage to property.
- 10.2. Transportation off-site, to or from off-site, or between buildings on the LBNL site that are not adjacent.
 - Unopened Containers in Original DOT Packaging (e.g. boxes or other DOT approved containment): Facilities Department Transportation will transport. Call Larry Gilbert, x5404.
 - Unopened Containers (not in DOT containment): Hazardous Waste will transport. Call Howard Hansen, x5867.
 - Opened Containers: Hazardous Waste will transport. Call Howard Hansen, x5867.
 - Compressed Gas Cylinders: Facilities Department Transportation will transport. Call Larry Gilbert, x5404.
- 10.3. Transportation within buildings or between adjacent buildings on the LBNL site: This category covers short distances that two people can reasonably transport in one trip utilizing appropriate hand carts and secondary containment. Chemical Hygiene & Safety (CHS) EHS 348 is required.
 - Unopened Containers in Original DOT Packaging (e.g. boxes or other DOT approved containment): Employees with CHS training (EHS 348).
 - Unopened Containers (not in DOT containment). Employees with CHS training (EHS 348).
 - Opened Containers: Employees with CHS training (EHS 348).
 - Compressed Gas Cylinders: Employees with CHS training (EHS 348) may use standard cylinder carts to transport cylinders within buildings and between adjoining buildings. Carts are preferred, but cylinders weighing 11 kg (25 lb) or less may be hand-carried. Valve protection caps and plugs must be in place during movement of cylinders. Lecture bottles and other

cylinders without protective caps must be transported in standard shipping crates, or an equivalent container..

11. Student Shop

Students who wish to use the Student Shop, Bldg 62-101, must receive training or be checked out by shop personnel on the machine tools and facilities.

12. Laser Radiation Safety.

Before starting work with or modifying any laser, the Laser Safety Officer (Ted Decastro, x5256, TMDecastro@lbl.gov) must be contacted. Lasers are grouped by hazard class (I-IV) based on their power output. A detailed description of the classification scheme is in Pub 3000 (<http://cms.lbl.gov/ehsdiv/pub3000/CH16.html>). Control measures are required for all lasers except Class I.

- Class II have a cw power output below 1 mW; a laser caution sign on the laser is required.
- Class IIIa lasers have a cw power output of 1 - 5 mW. The control measures are the same as for Class II lasers unless the light is to be viewed through optical instruments (e.g., binoculars, telescopes, or microscopes).
- Users of Class IIIb (5 - 500 mW cw) and Class IV (> 500 mW cw) lasers must take EHS 280 (Laser Safety Training) and take a Laser Eye Exam (Medical Services Department, x7378). The laser training course can be customized by the Laser Safety Officer for the specific needs of the research group; otherwise, the course is offered monthly. The use of Class IIIb and Class IV lasers requires an Activity Hazard Document (AHD), danger labels, door interlocks, and (possibly) other control measures.

13. Ionizing Radiation, Radioactive Materials, and Biohazards

13.1. Personnel who wish to use the MSD X-ray equipment in Bldg. 62 must take EHS 410 (X-Ray Machine Safety) and be added to the Qualified Users List by Eduardo Saiz (x6202, ESaiz@lbl.gov). Contact Ted Decastro (x5256, TMDecastro@lbl.gov) to arrange for training. Film badges must be worn by all users of X-ray facilities and are issued at the dosimetry office (90-0026, x7497).

13.2. Work with radioactive sources and materials may require a Radiation Work Authorization (RWA), a Sealed Source Authorization (SSA), and specialized training. Contact the EH&S Division if you are planning work with radioactive sources and material.

13.3. Biohazard work is categorized into four hazard levels and requires special authorization and training. Level 3 and 4 work is not permitted at Berkeley Lab. You must contact Bruce King of EH&S Division (x2768, BWKing@lbl.gov) if you are planning to perform biohazard work.

14. Earthquake and Seismic Safety

14.1. All items that might tip over must be securely anchored to the wall or floor.

14.2. If an earthquake occurs while you are indoors, do not attempt to leave the building. Take shelter under a desk or sturdy table.

- If you are outside, move into an open area away from power lines. If you are in an automobile, stop in an open area away from buildings. Avoid downed wires and be alert to structural

hazards.

- Give assistance to persons who are injured or trapped. Remember that emergency help may not arrive quickly after a major quake. Do not leave the Laboratory by automobile. Do not use the telephone. Lines must be kept clear for use by emergency services.
- Learn your evacuation routes. Study the posted fire and earthquake evacuation maps on your floor. If it is necessary to evacuate the building after the earthquake, do not use the elevator. Proceed to your assigned assembly area.

14.3 LBNL maintains a recording that provides updates on lab status during and after an emergency. The phone number is 1-800-445-5380. Use this number to determine whether to return to the laboratory after an emergency.